AC Power
For *Business-Critical Continuity™*

Liebert® NXL™

Installation Manual — 250-400kVA, 60Hz, Three Phase Single-Module

EMERSON
Network Power

CONTACTING LIEBERT FOR SUPPORT

To contact Liebert Services for information or repair service in the United States, call 1-800-LIEBERT (1-800-543-2378). Liebert Services offers a complete range of start-up services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact Liebert Services, if available in your area. For areas not covered by Emerson Network Power Liebert Services, the authorized distributor is responsible for providing qualified, factory-authorized service.

For LGS to assist you promptly, please have the following information available:

Part numbers: _____

Serial numbers:_____

Rating: _____

Date purchased: _____

Date installed:_____

Location:_____

Input voltage/frequency:_____

Output voltage/frequency: _____

Battery reserve time:_____

Product Warranty Registration

To register for warranty protection, visit the **Service and Support** section of our Web site at:

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Click on **Product Registration** and fill out the form.

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SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of your Liebert NXL™ UPS.Read this manual thoroughly, paying special attention to the sections that apply to your installation, before working with the UPS. **Retain this manual for use by installing personnel.**

⚠ WARNING

Risk of electrical shock. Can cause personal injury or death.

This UPS has several circuits that are energized with high DC as well as AC voltages. Check for voltage with both AC and DC voltmeters before working within the UPS. Check for voltage with both AC and DC voltmeters before making contact.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the UPS or preparing the UPS for installation. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats.

In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.

Extreme caution is required when performing installation and maintenance.

Special safety precautions are required for procedures involving handling, installation and maintenance of the UPS system. Observe all safety precautions in this manual before handling or installing the UPS system. Observe all precautions in the Operation and Maintenance Manual, SL-25425, before as well as during performance of all maintenance procedures. Observe all DC safety precautions before working on or near the DC system.

⚠ WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Exercise extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel. The UPS module weight ranges from 3965 to 5250lb (1768 to 2381kg).

Locate center of gravity symbols ⊕ and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the modules cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.

Read all of the following instructions before attempting to move, lift, remove packaging from or preparing unit for installation.

⚠ WARNING

Risk of electrical shock and fire. Can cause equipment damage, personal injury or death.

Under typical operation and with all UPS doors closed, only normal safety precautions are necessary. The area around the UPS system should be kept free of puddles of water, excess moisture and debris.

Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potential electric charges may exist at the capacitor banks and at the DC connections.

All wiring must be installed by a properly trained and qualified electrician. All power and control wiring must comply with all applicable national, state and local codes.

One person should never work alone, even if all power is disconnected from the equipment. A second person should be standing by to assist and to summon help in case of an accident.

NOTE

Emerson Network Power neither recommends nor knowingly sells this product for use with life support or other FDA-designated "critical" devices.

NOTICE

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this unit in a residential area may cause harmful interference that the user must correct at his own expense.

1.0 SINGLE-MODULE MECHANICAL INSTALLATION

1.1 Introduction

This following section describes the requirements that must be taken into account when planning the positioning and cabling of the Liebert NXL uninterruptible power supply and related equipment.

This chapter is a guide to general procedures and practices that should be observed by the installing personnel. The particular conditions of each site will determine the applicability of such procedures.

WARNING

Risk of electrical shock. Can cause injury or death.

Special care must be taken when working with the batteries associated with this equipment. When connected together, the battery terminal voltage will exceed 400VDC and is potentially lethal.

NOTICE

All equipment not referred to in this manual is shipped with details of its own mechanical and electrical installation.

NOTICE

Three-phase input supply required.

The standard Liebert NXL UPS is suitable for connection to three-phase, four-wire (+ Earth) TN-C, TN-S, IT-G, IT-IG or, three-phase, three-wire plus ground, IT-UG.

If using with IT Power system, a 4-pole disconnect device must be included as part of building installation.

NOTICE

Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer.

1.2 Preliminary Checks

Before installing the UPS, please carry out the following preliminary checks:

- Visually examine the UPS equipment for transit damage, both internally and externally. Report any damage to the shipper immediately.
- Verify that the correct equipment is being installed. The equipment supplied has an identification tag on the back of the main door reporting: the type, size and main calibration parameters of the UPS.
- Verify that the UPS room satisfies the environmental conditions stipulated in the equipment specification, paying particular attention to the ambient temperature and air exchange system.

1.3 Environmental Considerations

1.3.1 UPS Room

The UPS module intended for indoor installation and should be located in a cool, dry, clean-air environment with adequate ventilation to keep the ambient temperature within the specified operating range (see **Environmental Parameters** in **Table 6**).

The Liebert NXL UPS is cooled with the aid of internal fans. To permit air to enter and exit and prevent overheating or malfunctioning, do not cover the ventilation openings.

The Liebert NXL UPS is equipped with air filters located behind the front doors. A schedule for inspection of the air filters is required. The period between inspections will depend upon environmental conditions.

When bottom entry is used, the conduit plate must be installed.

NOTE

The UPS is suitable for mounting on concrete or other non-combustible surface only.

1.3.2 Storage

Should the equipment not be installed immediately, it must be stored in a room for protection against excessive humidity and or heat sources (see **Environmental Parameters** in **Table 6**).

1.4 Positioning

The cabinet is structurally designed to handle lifting from the base.

Access to the power terminals, auxiliary terminals blocks and power switches is from the front.

The door can be opened to give access to the power connections bars, auxiliary terminal blocks and power isolators. Front door can be opened at 180° for more flexibility in installations.

1.4.1 Moving the Cabinets

The route to be travelled between the point of arrival and the unit's position must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc. are adequate and that there are no impassable corners or changes in the level of corridors).

Ensure that the UPS weight is within the designated surface weight loading (kg/cm^2) of any handling equipment. For weight details, see **Table 6**.

The UPS can be handled with a forklift or similar equipment. Ensure any lifting equipment used in moving the UPS cabinet has sufficient lifting capacity. When moving the unit by forklift, care must be taken to protect the panels. Do not exceed a 15-degree tilt with the forklift. Bottom structure will support the unit only if the forks are completely beneath the unit.

Handling with straps is not authorized.

WARNING

Risk of heavy unit falling over. Improper handling can cause equipment damage, injury or death.

Because the weight distribution in the cabinet is uneven, use extreme care while handling and transporting. Take extreme care when handling UPS cabinets to avoid equipment damage or injury to personnel.

The UPS module weight ranges from 3965 to 5250lb (1768 to 2381kg).

Locate center of gravity symbols and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

1.4.2 Clearances

The Liebert NXL has no ventilation grilles at either side or at the rear of the UPS. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened. It is important to leave a distance of 24" (610mm) between the top of the UPS and any overhead obstacles to permit adequate circulation of air coming out of the unit.

1.4.3 Floor Installation/Anchoring

If the equipment is to be located on a raised floor it should be mounted on a pedestal suitably designed to accept the equipment point loading. Refer to the base view to design this pedestal.

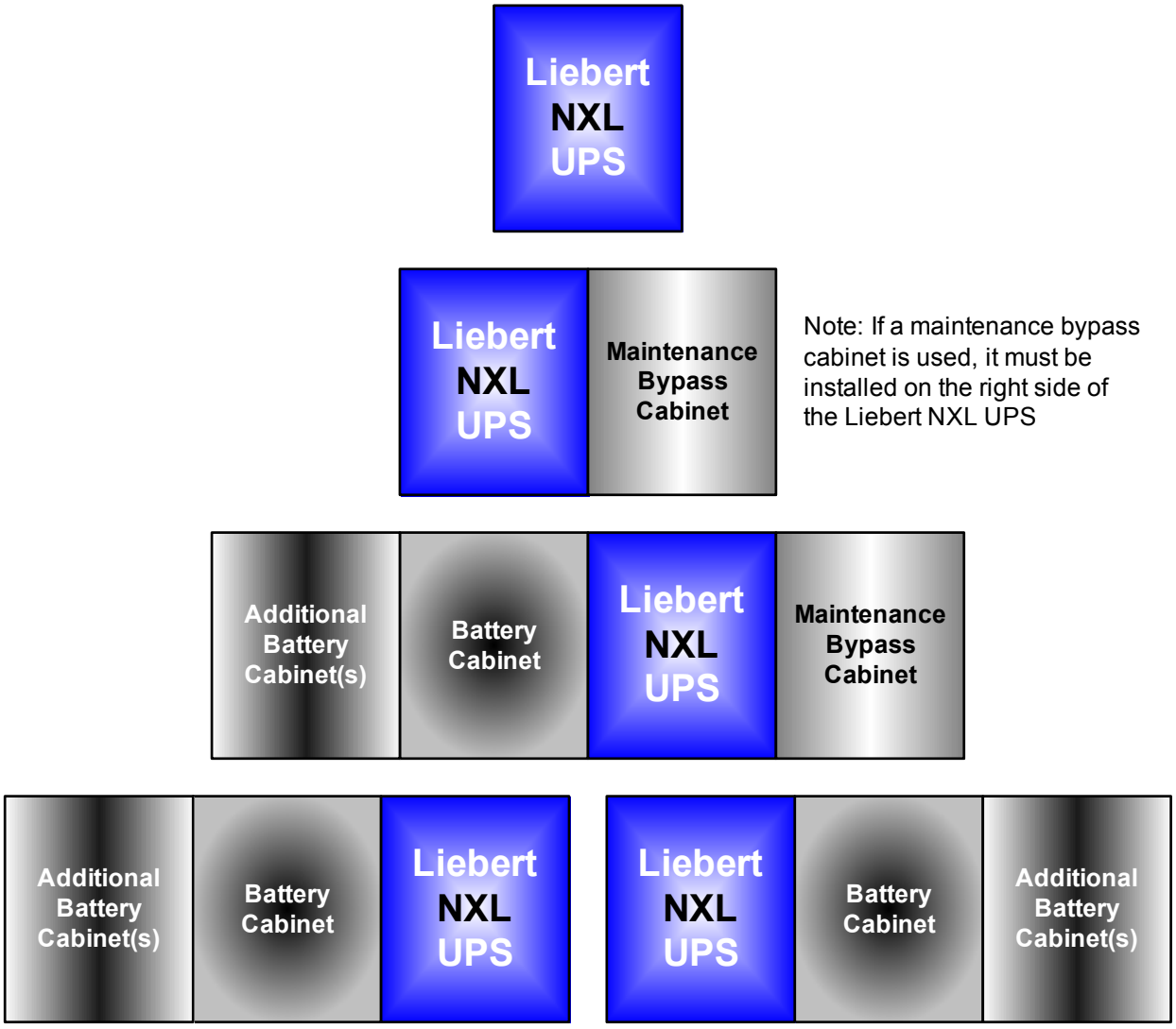
1.5 System Composition

A UPS system can comprise a number of equipment cabinets, depending on the individual system design requirements, e.g. UPS cabinet, battery cabinet, maintenance bypass cabinet. In general, all the cabinets used in a particular installation are of the same height. Refer to the drawings provided in **4.0 - Installation Drawings** for the positioning of the cabinets as shown in **Figure 1**.

1.6 Cable Entry

Cables can enter the UPS cabinet from bottom or top into the Input/Output (I/O) section of the unit, see the figures in **4.0 - Installation Drawings**.

Figure 1 Cabinet arrangement—Liebert NXL, battery cabinets, maintenance bypass cabinet


Liebert NXL UPS
Liebert NXL UPS
Maintenance Bypass Cabinet
Note: If a maintenance bypass cabinet is used, it must be installed on the right side of the Liebert NXL UPS
Additional Battery Cabinet(s)
Battery Cabinet
Liebert NXL UPS
Maintenance Bypass Cabinet
Additional Battery Cabinet(s)
Battery Cabinet
Liebert NXL UPS
Liebert NXL UPS
Battery Cabinet
Additional Battery Cabinet(s)

2.0 UPS ELECTRICAL INSTALLATION

This chapter provides guidelines for qualified installers who must have knowledge of local wiring practices pertaining to the equipment to be installed.

WARNING

Risk of electrical shock. Can cause injury or death.

The UPS contains high DC as well as AC voltages. Check for voltage with both AC and DC voltmeters before working within the UPS.

Only properly trained and qualified personnel wearing appropriate safety headgear, gloves, shoes and glasses should be involved in installing the UPS or preparing the UPS for installation.

2.1 External Protective Devices

For safety, it is necessary to install circuit breakers in the input AC supply and external battery system. Given that every installation has its own characteristics, this section provides guidelines for qualified installation personnel with knowledge of operating practices, regulatory standards and the equipment to be installed.

External overcurrent protection must be provided. See **Table 6 - Liebert NXL UPS specifications** for overload capacity.

Dual Input

When wiring the UPS with a separate rectifier and bypass input, each input must be protected separately. Size the breakers according to the input currents shown in **Table 6**.

2.2 Power Cables

The UPS requires both power and control cabling. All control cables, whether shielded or not, should be run separate from the power cables in metal conduits or metal ducts which are electrically bonded to the metalwork of the cabinets to which they are connected

The cable design must comply with the voltages and currents in **Table 6**, follow local wiring practices and take into consideration the environmental conditions (temperature and physical support media), room temperature and conditions of installation of the cable and system's overload capacity (see **5.0 - Specifications**).

For cable entry terminal, refer to **Figure 7**.

WARNING

Risk of electrical shock. Can cause injury or death.

Before cabling the UPS, ensure that you are aware of the location and operation of the external isolators that connect the UPS input/bypass supply to the power distribution panel.

Check that these supplies are electrically isolated, and post any necessary warning signs to prevent their inadvertent operation.

NOTICE

For dual input operation ensure that any busbars between the bypass and the rectifier input are removed.

When sizing battery cables, a maximum volt drop of 2VDC is permissible at the current ratings given in **Table 7**.

The following are guidelines only and superseded by local regulations and codes of practice where applicable:

- Take special care when determining the size of the neutral cable (grounded conductor), because current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to the values in **Table 6**.
- The grounding conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The grounding cable connecting the UPS to the main ground system must follow the most direct route possible.
- Consideration should be given to the use of paralleled smaller cables for heavy currents, as this can ease installation considerably.

2.2.1 Power Cable Connection Procedure

The rectifier input, bypass, output and battery power cables (all require lug type terminations) are connected to busbars situated in the I/O section as shown in **Figures 7** through **9**.

Equipment Ground

The equipment ground busbar is located in the I/O section as shown in **Figure 7**. The grounding conductor must be connected to the ground busbar and bonded to each cabinet in the system.

All cabinets and cabling should be grounded in accordance with local regulations.

NOTE
Proper grounding reduces problems in systems caused by electromagnetic interference.

WARNING
Failure to follow adequate grounding procedures can result in electric shock hazard to personnel, or the risk of fire, should a ground fault occur.

All operations described in this section must be performed by properly trained and qualified electricians or technical personnel. If any difficulties are encountered, contact Liebert Services. See the back page of this manual for contact information.

The grounding and neutral bonding arrangement must be in accordance with local and national codes of practice.

Once the equipment has been positioned and secured, connect the power cables as described below (refer to the appropriate cable connection drawing in **4.0 - Installation Drawings**):

1. Verify that the UPS equipment is isolated from its external power source and all the UPS power isolators are open. Check that these supplies are electrically isolated and post any necessary warning signs to prevent their inadvertent operation.
2. Open exterior and interior panels on the front of the I/O.
3. Connect the ground and any necessary main bonding jumper to the equipment ground busbar located in the I/O section.
4. Make power connections and tighten the connections to the proper torque according to one of the two procedures below, depending on the type of installation:

   Ensure correct phase rotation.

   - Top Cable Entry (see **Figure 8**)
   - Bottom Cable Entry (see **Figure 9**)

   Top Cable Entry

   When making the power connections for top cable entry, the recommended order of pulling and installing cables is to start from the top connections to the bottom connections. The cables must be routed around the fault braces (see Detail in **Figure 8**). This is to prevent the cables from contacting other busbars. The recommended conduit layout is shown in **Figure 7**.

Bottom Cable Entry

When making the power connections for bottom cable entry, the recommended order of pulling and installing cables is to start from the bottom connections to the top connections. The cables must be routed around the fault braces (see Detail in **Figure 9**). This is to prevent the cables from contacting other busbars. The recommended conduit layout is shown in **Figure 7**.

NOTE

For a Single Input configuration, linking busbars must be installed between the bypass and the rectifier input.

WARNING

Risk of electrical shock. Can cause injury or death.

If the load equipment will not be ready to accept power on the arrival of the commissioning engineer, ensure that the system output cables are safely isolated at their termination.

WARNING

Risk of electrical shock. Can cause injury or death.

When connecting the cables between the battery extremities to the circuit breaker always connect the circuit breaker end of the cable first.

5. For control connection details, see **2.3 - Control Cable and Communications**.

NOTE

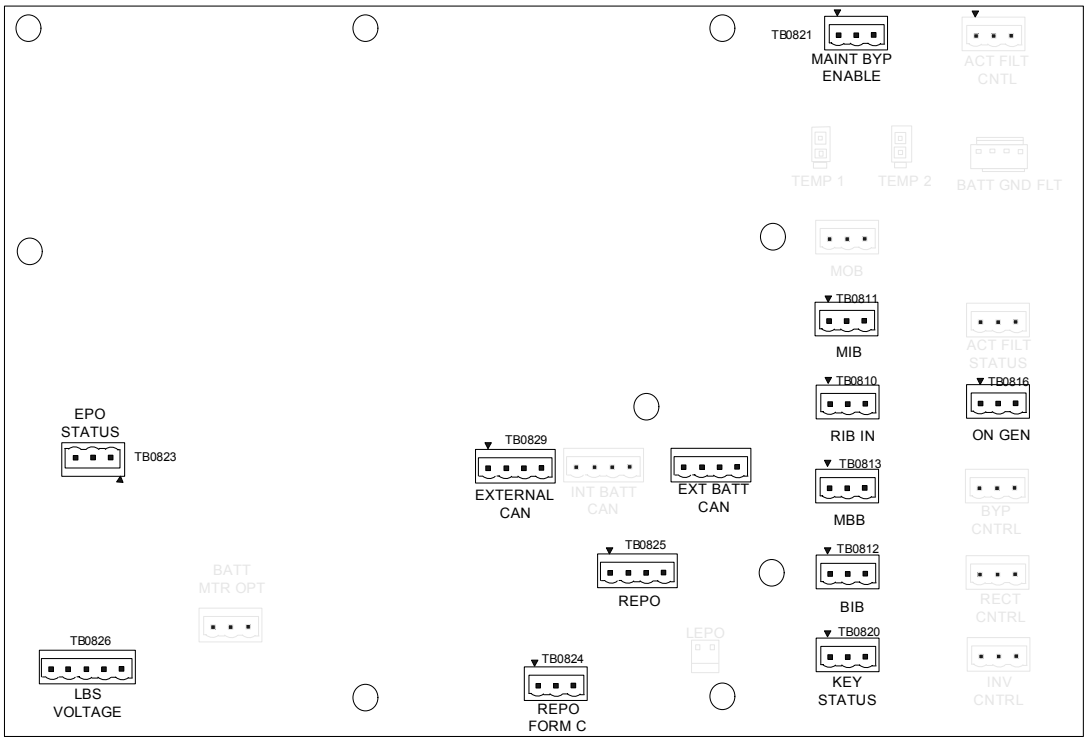
If fault bracing brackets were removed during installation, they MUST be replaced.

6. Close and secure the interior and exterior doors.

2.3 Control Cable and Communications

Based on your site's specific needs, the UPS may require auxiliary connections to manage the battery system (external battery circuit breaker), communicate with a personal computer or provide alarm signaling to external devices or for Remote Emergency Power Off (REPO). The External Interface Board, arranged for this purpose, is on the rear of the operator access door.

Figure 2 External Interface Board connections layout



2.3.1 Dry Contacts

Volt-free and isolated contacts are used for interfacing to customer connections external to the NXL unit. These circuits use at least 8mA of current at +24V.

NOTE
All auxiliary cables must be segregated from power circuits (for shielding), must be double-insulated and should be 12-24AWG (2.5-0.2mm^2) stranded for maximum runs between 82-164 ft. (25 and 50m) respectively.

NOTE
If connection to more than one module is required, use a separate contact for each module.

EPO Input Dry Contact

Table 1 Remote EPO input

Item	Terminal Block	Pin	Connects to (description of external item)	Description of interface
Remote EPO Input Form C	TB0824	1	REPO Switch, normally open contact	Input, protected
		2	REPO Switch, common contact	+24V, 10mA, current limited
		3	REPO Switch, normally closed contact, set jumper J5: 1-2 to enable, 2-3 to disable	Input, protected

Control Status Inputs Dry Contact

The following inputs can sense either a normally open or normally closed contact.

Table 2 Control or status inputs

Item	Terminal Block	Pin	Connects to (description of external item)	Description of interface
On Generator Input Form C	TB0816	1	On generator switch, closed = on generator	Input, protected
		2	On generator switch, common	+24V, 10mA, current limited
		3	On generator switch, closed = not on generator	Input, protected
Key Status Input Form C	TB0820	1	Key status switch, closed = key removed	Input, protected
		2	Key status switch, common	+24V, 10mA, current limited
		3	Key status switch, closed = key inserted	Input, protected

Switch Auxiliary Inputs Dry Contacts

Table 3 Circuit breaker or switch auxiliary contact Inputs

Item	Terminal Block	Pin	Connects to (description of external item)	Description of interface
Rectifier Input Breaker (RIB), Form C	TB0810	1	CB or Switch aux. contact, closed = CB or switch is closed	Input, protected
		2	CB or Switch aux. contact, common	+24V, 10mA, current limited
		3	CB or Switch aux. contact, closed = CB or switch is open	Input, protected
Maintenance Isolation Breaker (MIB), Form C	TB0811	1	CB or Switch aux. contact, closed = CB or switch is closed	Input, protected
		2	CB or Switch aux. contact, common	+24V, 10mA, current limited
		3	CB or Switch aux. contact, closed = CB or switch is open	Input, protected
Bypass Input Breaker (BIB), Form C	TB0812	1	CB or Switch aux. contact, closed = CB or switch is closed	Input, protected
		2	CB or Switch aux. contact, common	+24V, 10mA, current limited
		3	CB or Switch aux. contact, closed = CB or switch is open	Input, protected
Maintenance Bypass Breaker (MBB), Form C	TB0813	1	CB or Switch aux. contact, closed = CB or switch is closed	Input, protected
		2	CB or Switch aux. contact, common	+24V, 10mA, current limited
		3	CB or Switch aux. contact, closed = CB or switch is open	Input, protected

Control Status Output Dry Contacts

Status signals are outputs through volt-free, normally open and normally closed contacts.

Table 4 Control status output contact

Item	Terminal Block	Pin	Connects to (description of external item)	Description of interface
EPO Status Form C	TB0823	1	Other equipment input, closed = EPO not active	Relay contact, 12A, 250VAC, normally closed, rest position = closed
		2	Other equipment input, common	Relay contact, common
		3	Other equipment input, closed = EPO active	Relay contact, 12A, 250Vac, normally open, rest position = open
Maintenance Bypass Enable Form C	TB0821	1	Maintenance Bypass Cabinet, closed = load not on inverter	Relay contact, 12A, 250Vac, normally closed, rest position = closed
		2	Maintenance Bypass Cabinet, common	Relay contact, common
		3	Maintenance Bypass Cabinet, closed = load on inverter	Relay contact, 12A, 250VAC, normally open, rest position = open

2.3.2 Load Bus Synch Connection

Table 5 Load Bus Synch connection

Item	Terminal Block	Pin	Connects to (description of external item)	Description
Analog Load Bus Sync. (LBS)	TB0826	1	Phase A from LBS	Input to voltage dropping resistors
		3	Phase B from LBS	Input to voltage dropping resistors
		5	Phase C from LBS	Input to voltage dropping resistors

3.0 OPTIONAL EQUIPMENT

3.1 Single-Module System Options

3.1.1 Matching Maintenance Bypass Cabinet

A matching Liebert NXL Maintenance Bypass cabinet is available. See Maintenance Bypass Cabinet Installation Manual (SL-24532) for more details.

3.1.2 Battery Temperature Sensor

The optional external battery temperature sensor kit, supplied separately from the battery circuit breaker, contains one probe and one temperature transport board.

3.1.3 Matching Liebert NXL Battery Cabinet

The optional matching Liebert NXL Battery Cabinet can be used to obtain the desired autonomy time. The battery cabinets are designed to be either attached to the UPS or installed in a separate battery room (for details, see the Liebert NXL Battery Cabinet installation manual, SL-25430, available at Liebert's Web site **www.liebert.com**).

3.1.4 Matching Module Battery Disconnect—MBD

The optional Module Battery Disconnect (MBD) can be used as a battery disconnect between a battery system and the Liebert NXL UPS. The battery cabinets are designed to be either attached to the UPS or battery cabinet or installed in a separate battery room (for details, see the Liebert NXL Battery Cabinet installation manual, SL-24530, available at Liebert's Web site **www.liebert.com**).

3.1.5 Load Bus Synch

An optional Load Bus Synch (LBS) system can be used to synchronize two Liebert NXL UPSs or an Liebert NXL UPS to a LiebertSeries 610 UPS (for details, see the Liebert NXL Load Bus Synch manual, SL-30105, available at Liebert's Web site: **www.liebert.com**)

3.2 Communication and Monitoring

- Liebert IntelliSlot® Web Card - SNMP/HTTP Network Interface Card
- Liebert IntelliSlot® 485 Web Card - Modbus, J-bus, IGM Net
- Remote Monitoring Services IntelliSlot Card
- RS485/422 Protocol Converter IntelliSlot Card
- Programmable Relay Board
- Input Contact Isolator Board

3.2.1 Alber Monitoring System

The matching Liebert NXL Battery Cabinet allows installing an optional Alber Battery monitoring system in the cabinet. The Alber Battery Monitoring by Liebert continuously checks all critical battery parameters, such as cell voltage, overall string voltage, current and temperature. Automatic periodic tests of internal resistance of each battery will verify the battery's operating integrity. Additional capabilities include automatic internal DC resistance tests and trend analysis providing the ability to analyze performance and aid in troubleshooting.

4.0 INSTALLATION DRAWINGS

Figure 3 Main components location, 250kVA Liebert NXL UPS

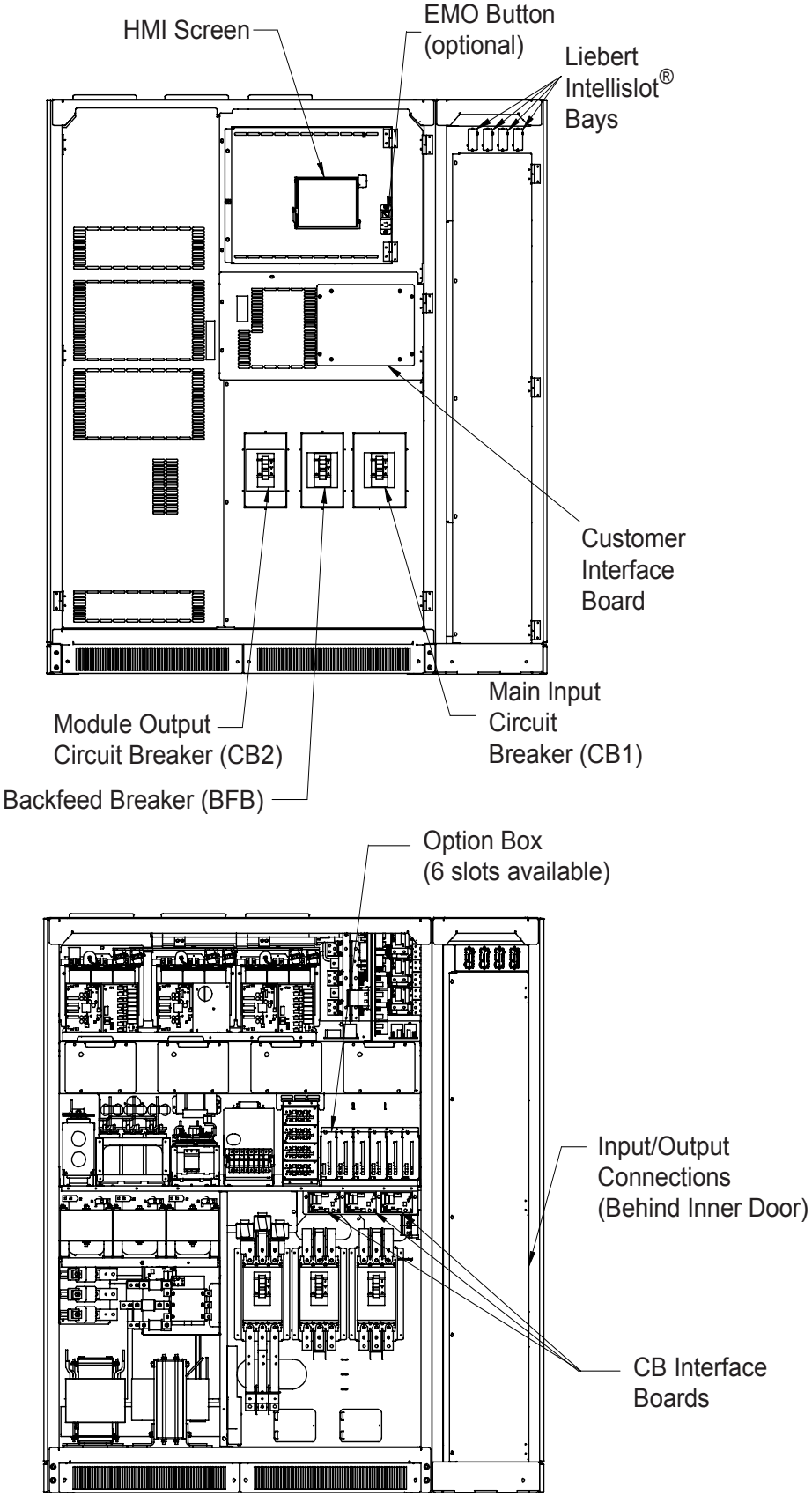
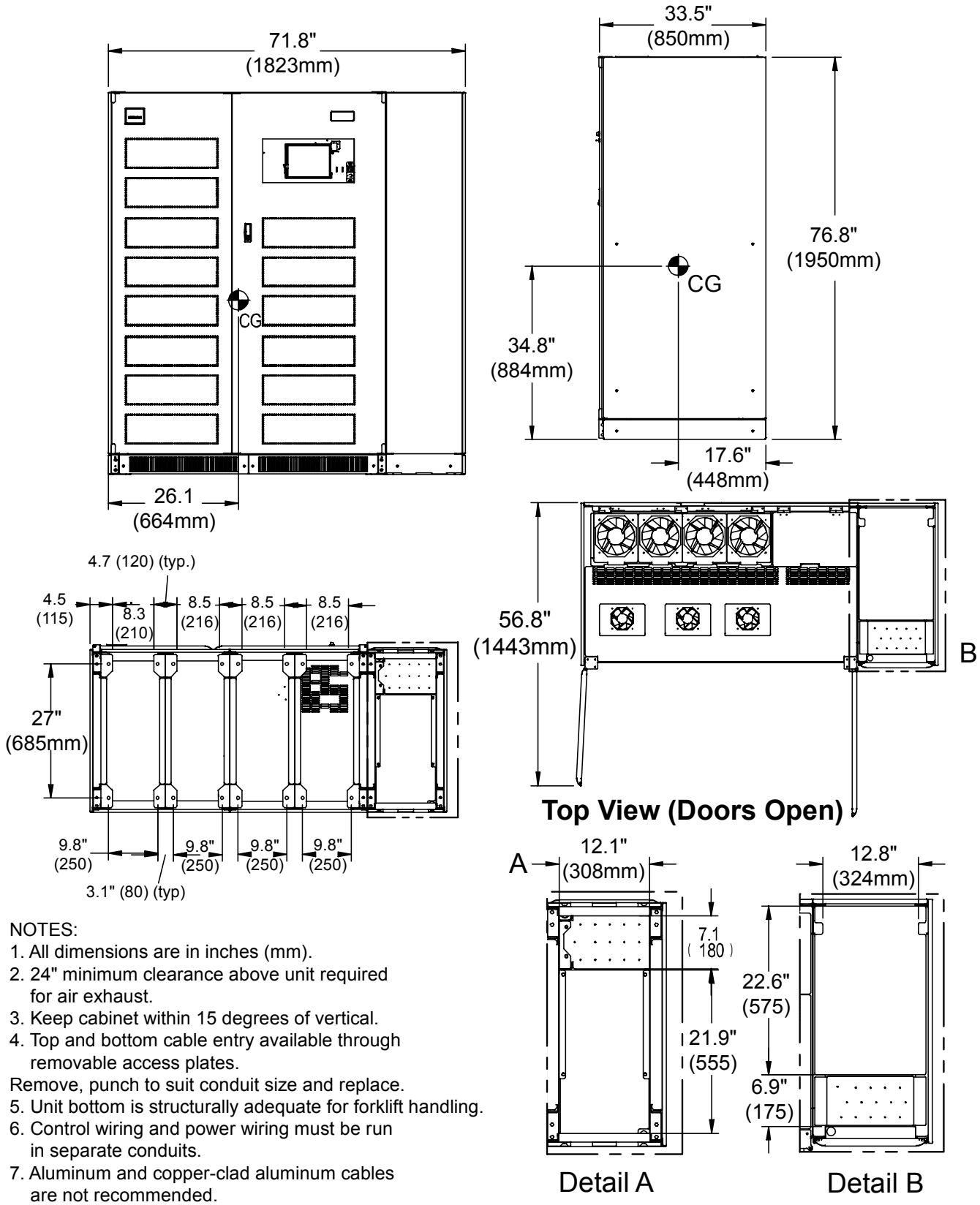


Figure 4 Outline drawing, 250kVA Liebert NXL UPS



NOTES:
1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
Remove, punch to suit conduit size and replace.
5. Unit bottom is structurally adequate for forklift handling.
6. Control wiring and power wiring must be run in separate conduits.
7. Aluminum and copper-clad aluminum cables are not recommended.
8. Widths are with side panels. the width is 70" (1778mm) without side panels.
9. The depth dimension includes the front door and rear panel.

Figure 5 Main components location, 300kVA Liebert NXL UPS

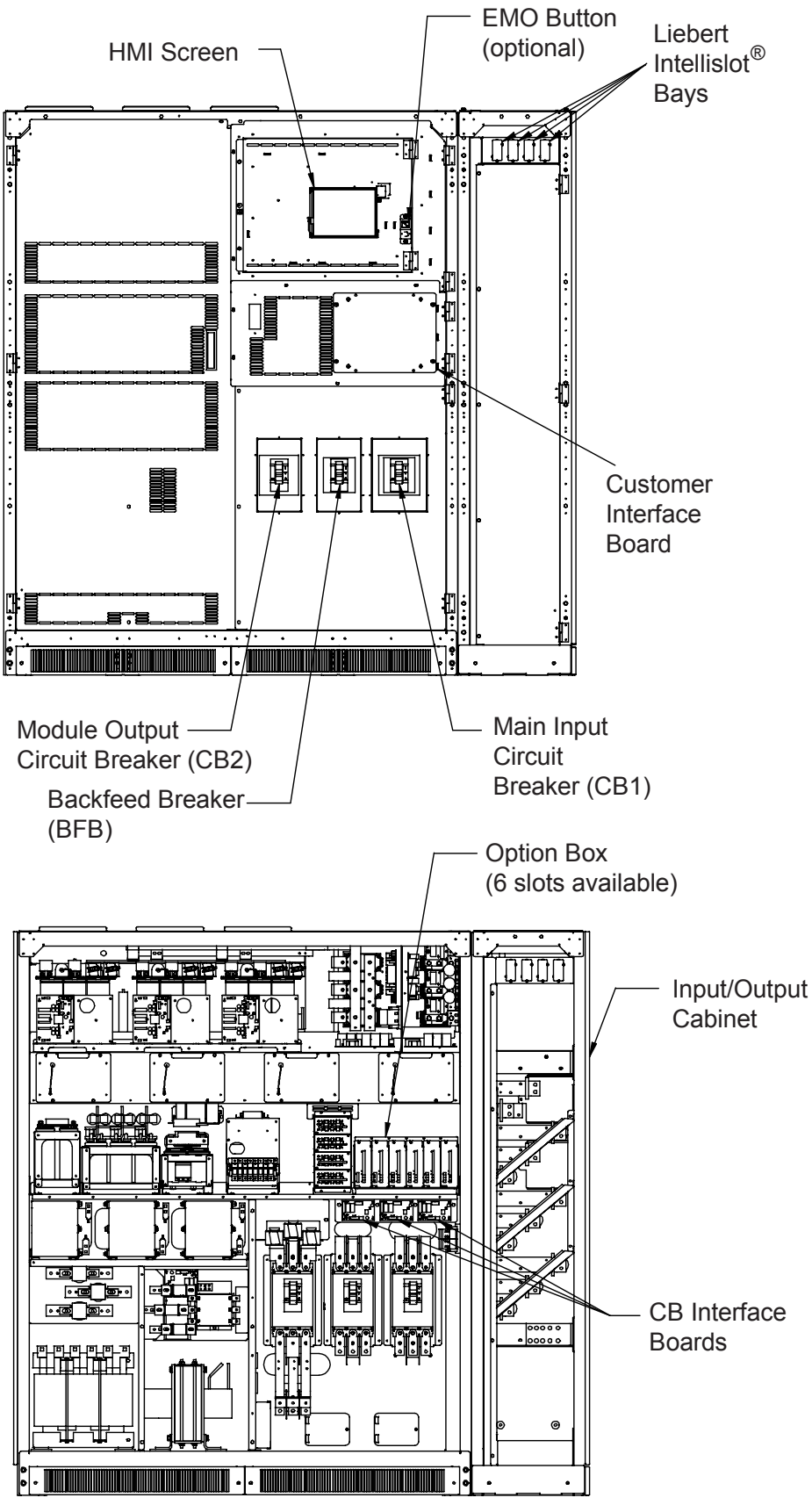
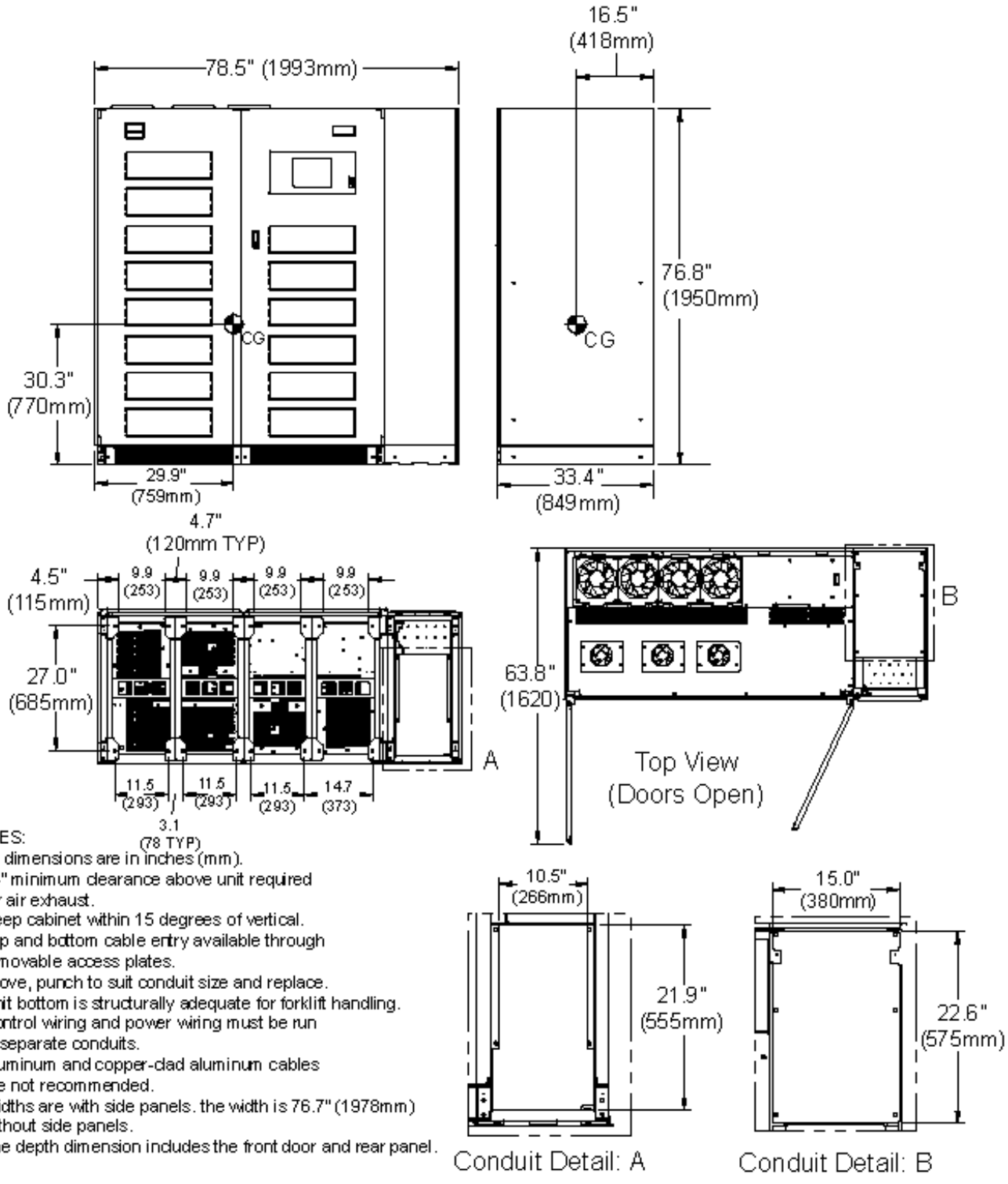
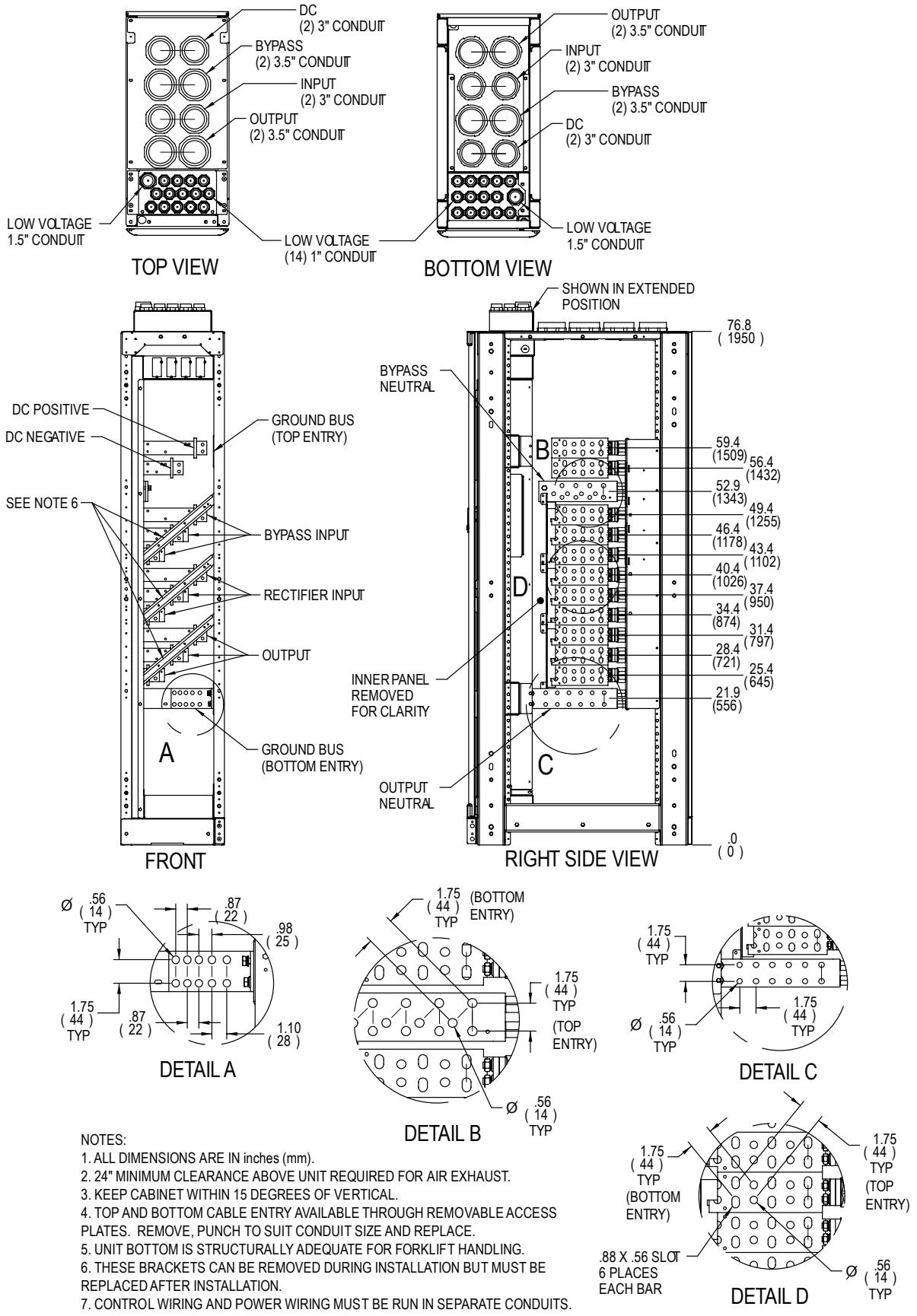


Figure 6 Outline drawing, 300kVA Liebert NXL UPS



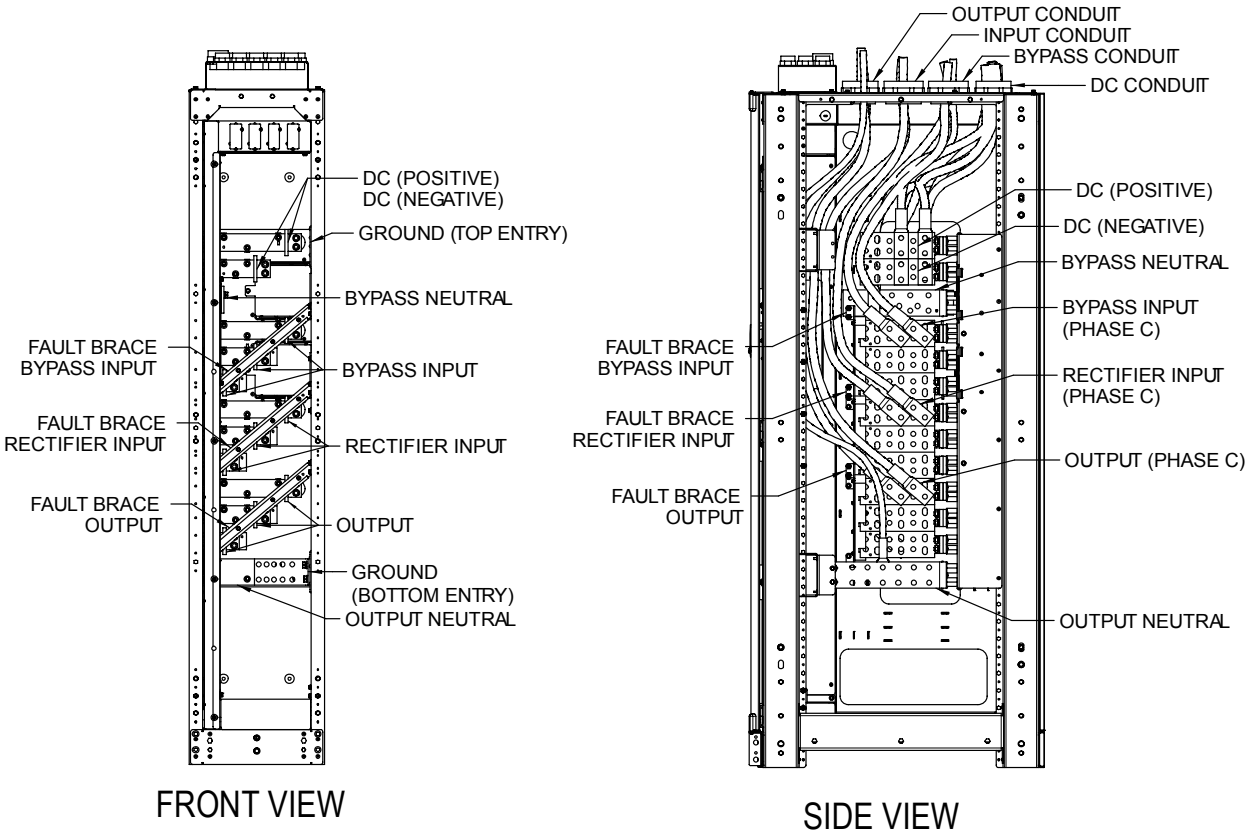
NOTES:
1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates.
Remove, punch to suit conduit size and replace.
5. Unit bottom is structurally adequate for forklift handling.
6. Control wiring and power wiring must be run in separate conduits.
7. Aluminum and copper-clad aluminum cables are not recommended.
8. Widths are with side panels. the width is 76.7" (1978mm) without side panels.
9. The depth dimension includes the front door and rear panel.

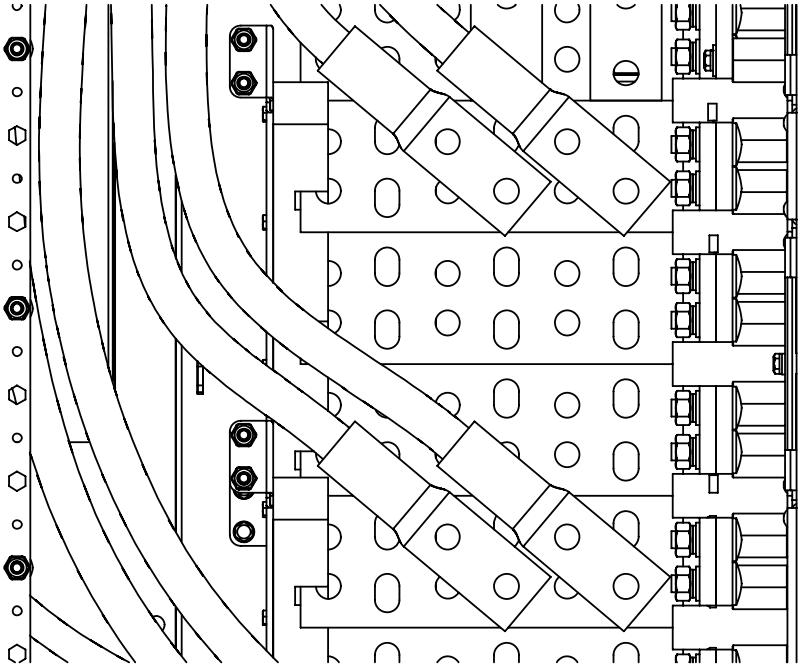
Figure 7 Input/output conduit detail drawing, 250-300kVA Liebert NXL UPS



NOTES:
1. ALL DIMENSIONS ARE IN inches (mm).
2. 24" MINIMUM CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. THESE BRACKETS CAN BE REMOVED DURING INSTALLATION BUT MUST BE REPLACED AFTER INSTALLATION.
7. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
8. ALUMINUM AND COPPER-CLAD ALUMINUM CABLES ARE NOT RECOMMENDED.
9. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

Figure 8 Top cable entry routing and installation order

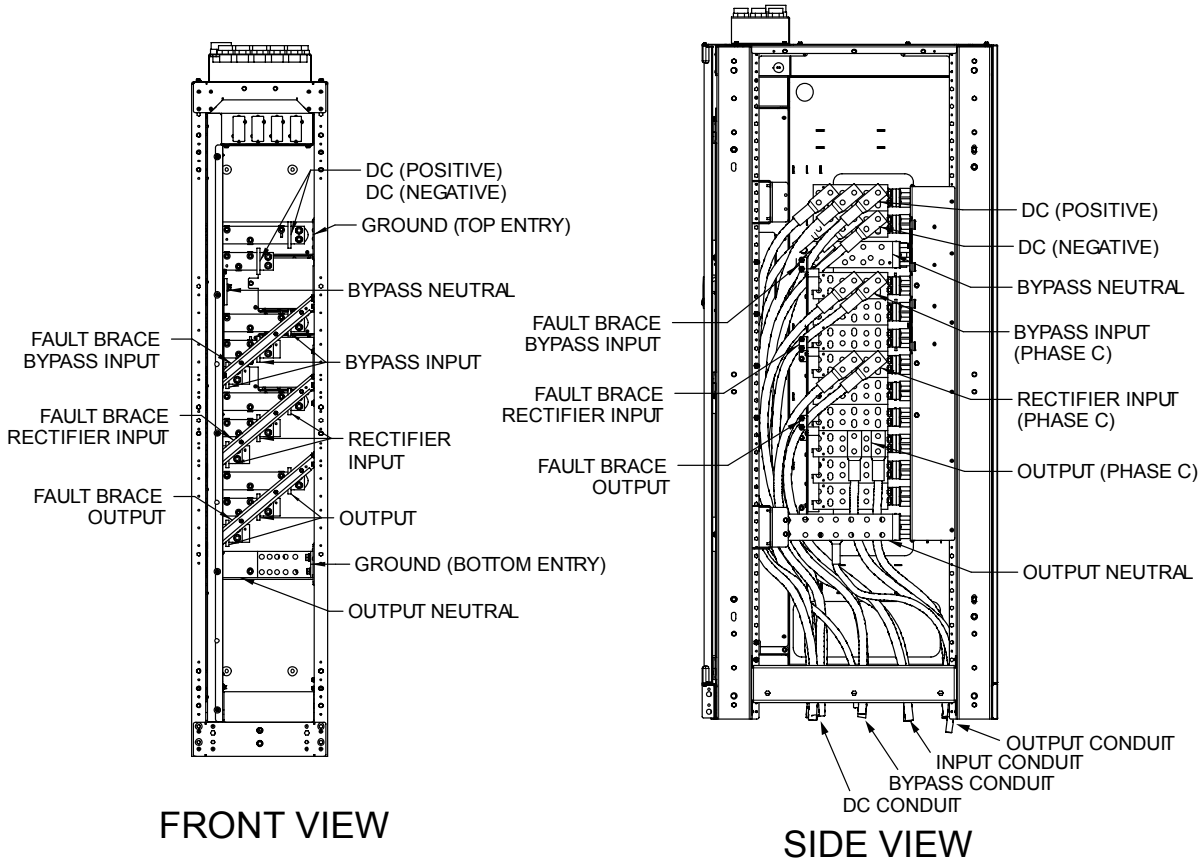


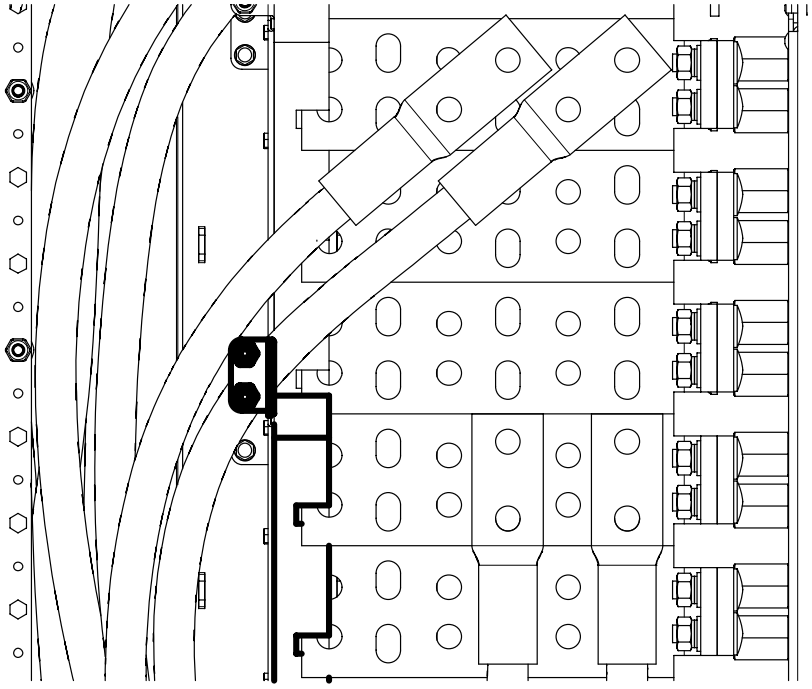


Recommended order of installation for cables:
1. DC Power
2. Bypass Neutral
3. Bypass Input Power (Phases A-B-C)
4. Rectifier Input Power (Phases A-B-C)
5. Output Power (Phases A-B-C)
6. Output Neutral
7. Ground

The cables must be routed around the fault braces. This is to prevent the cables from coming in contact with other busbars.

Figure 9 Bottom cable entry routing and installation order

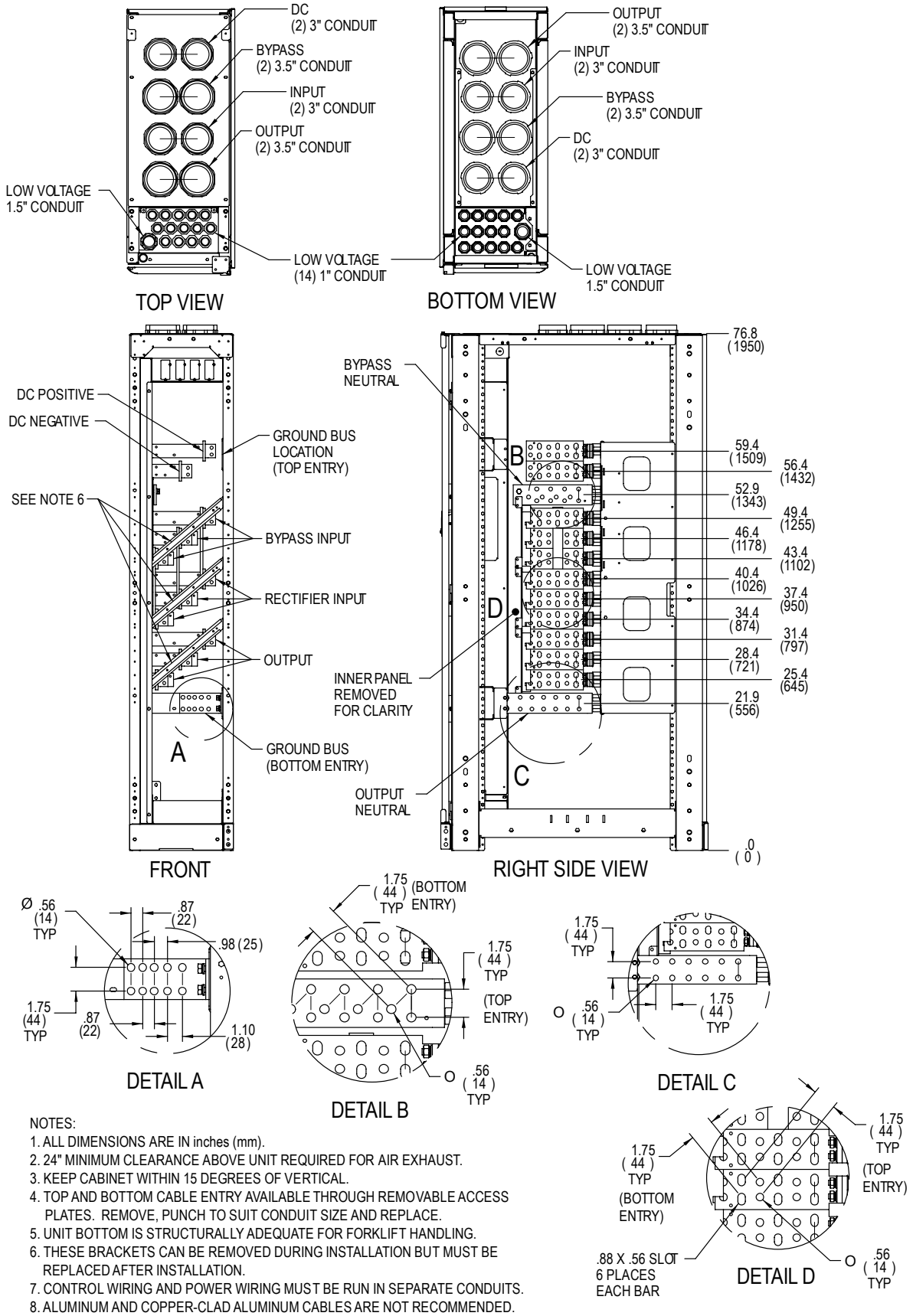




Recommended order of installation for cables:
1.) Output Neutral
2.) Output Power (Phases A-B-C)
3.) Rectifier Input Power (Phases A-B-C)
4.) Bypass Input Power (Phases A-B-C)
5.) Bypass Neutral
6.) DC Power
7.) Ground

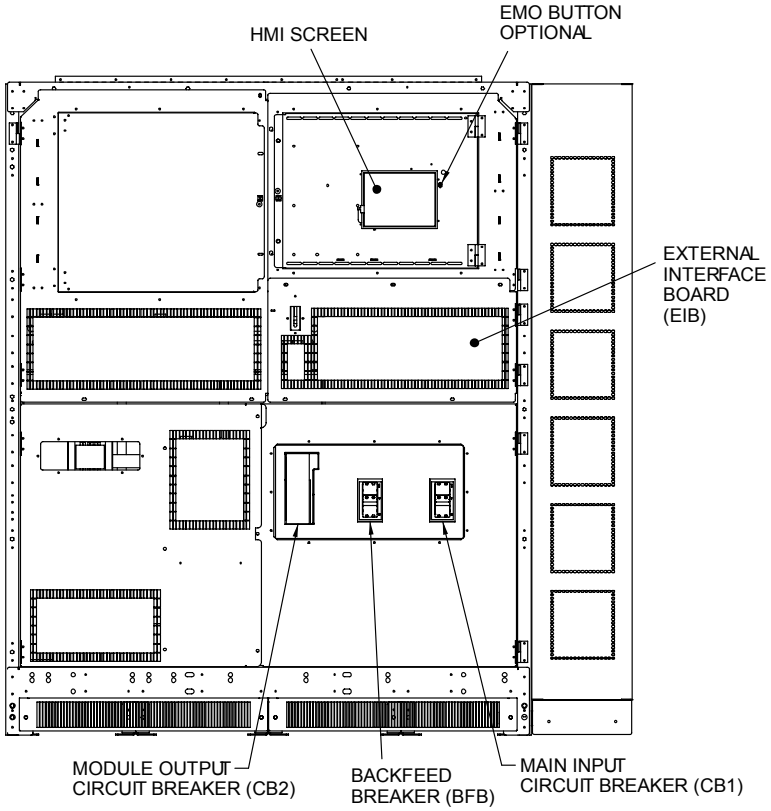
The cables must be routed around the fault braces. This is to prevent the cables from coming in contact with other busbars.

Figure 10 Input/output terminal detail, 400kVA Liebert NXL UPS

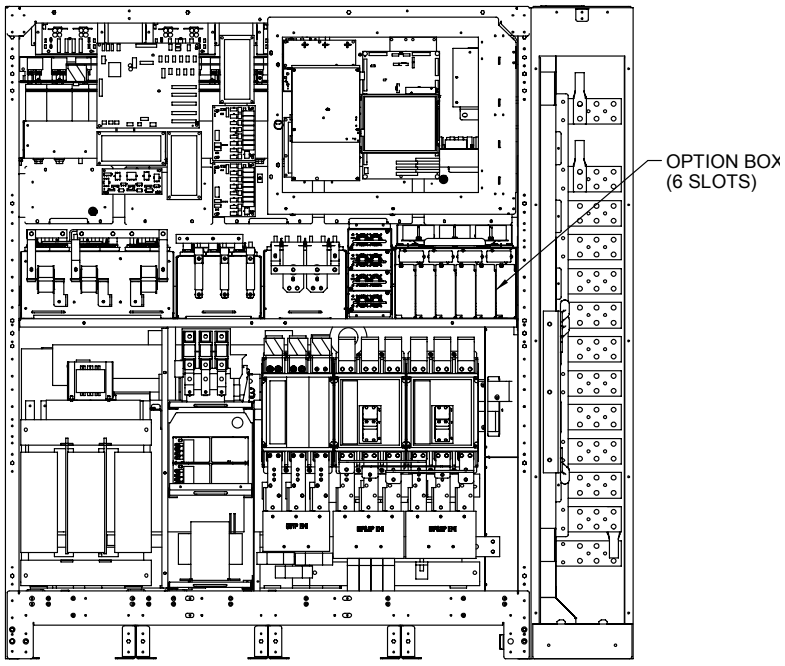


NOTES:
1. ALL DIMENSIONS ARE IN inches (mm).
2. 24" MINIMUM CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
3. KEEP CABINET WITHIN 15 DEGREES OF VERTICAL.
4. TOP AND BOTTOM CABLE ENTRY AVAILABLE THROUGH REMOVABLE ACCESS PLATES. REMOVE, PUNCH TO SUIT CONDUIT SIZE AND REPLACE.
5. UNIT BOTTOM IS STRUCTURALLY ADEQUATE FOR FORKLIFT HANDLING.
6. THESE BRACKETS CAN BE REMOVED DURING INSTALLATION BUT MUST BE REPLACED AFTER INSTALLATION.
7. CONTROL WIRING AND POWER WIRING MUST BE RUN IN SEPARATE CONDUITS.
8. ALUMINUM AND COPPER-CLAD ALUMINUM CABLES ARE NOT RECOMMENDED.
9. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

Figure 11 Main components, 400kVA Liebert NXL UPS

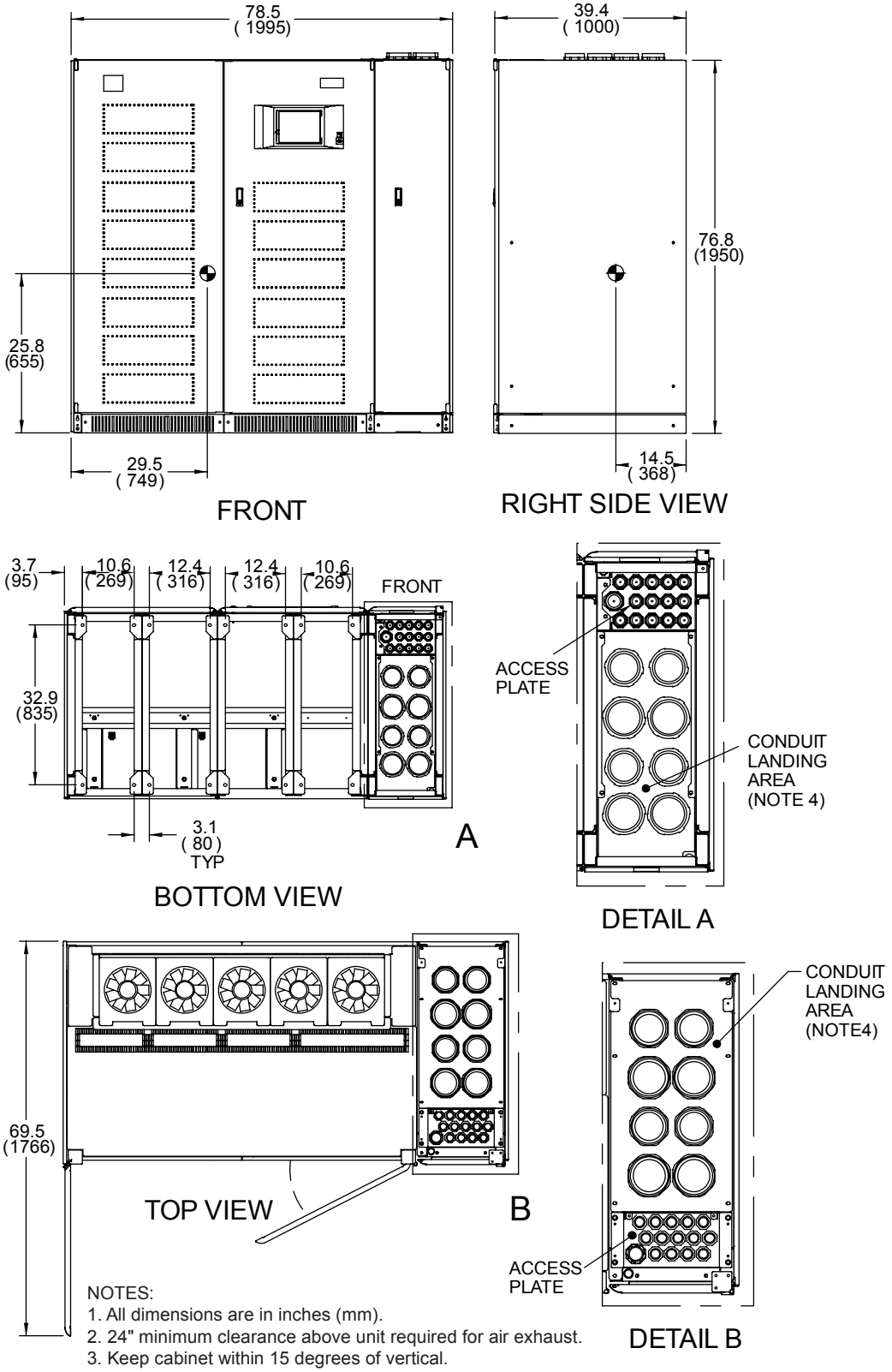


FRONT DOORS REMOVED



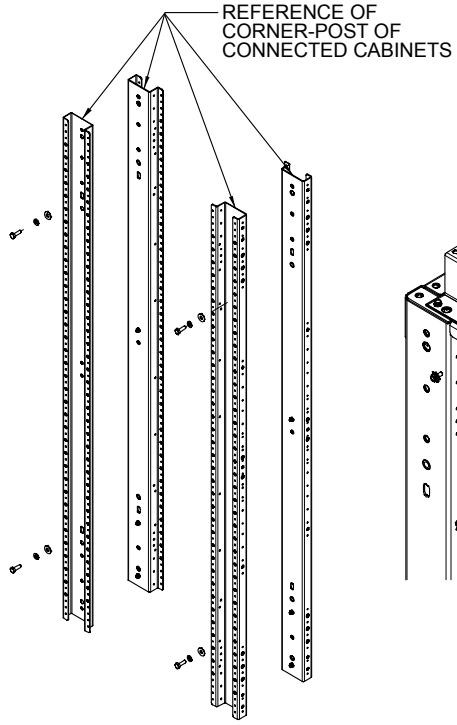
DOORS AND INNER SKINS REMOVED

Figure 12 Outline drawing, 400kVA Liebert NXL UPS

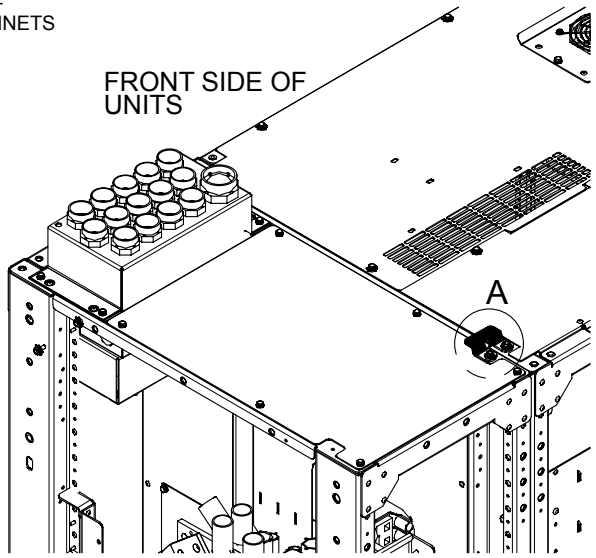


NOTES:
1. All dimensions are in inches (mm).
2. 24" minimum clearance above unit required for air exhaust.
3. Keep cabinet within 15 degrees of vertical.
4. Top and bottom cable entry available through removable access plates. Remove, punch to suit conduit size and replace.
5. Unit bottom is structurally adequate for forklift handling.
6. Control wiring and power wiring must be run in separate conduits.
7. Aluminum and copper-clad aluminum cables are not recommended.
8. Widths are with side panels. the width is 76.7" (1948mm) without side panels.
9. The depth dimension includes the front door and rear panel.

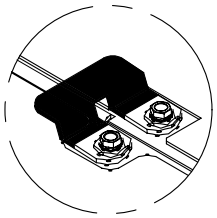
Figure 13 Ground strap location for connected cabinets



Cabinet-to-Cabinet
Bolting Instructions



Typical Ground Strap Installation
(Use for all connected units except battery cabinet)



Detail A

5.0 SPECIFICATIONS

Table 6 Liebert NXL UPS specifications

	250	300	400
Input Parameters			
Input Voltage to Rectifier, VAC	480V 3-phase, 3-wire		
Input Voltage to Bypass, VAC	480V 3-phase, 3-wire or 4-wire		
Input Voltage Range, VAC	+10% to -15 -15% to -20%* -20% to -30%** <-30%***		
Input Frequency, Hz	60		
Permissible Input Frequency Range, Hz	55 to 65		
Input THDi at Nominal Voltage at Full Load, %	<10% with 6-pulse & Passive Filter		
Power Walk-In, sec	3 to 30 (selectable) in 1 sec. Increment		
Neutral Current	1.7 times full-phase current		
Battery & DC Parameters			
Battery Type	VRLA (Valve Regulated Lead Acid) or (FLA) Flooded Lead Acid		
Nominal Battery Bus, VDC	480V		
Battery Float Voltage, VDC	540V		
Minimum End of Discharge Voltage, VDC	384V (for VRLA / Flooded Lead Acid)		
DC Ripple Voltage in Float & Const V Ch. Mode, %	<1 (RMS value) < 3,4% Vpp		
Temperature Compensated Battery Charging	Standard (with temperature probe)		
Output Parameters			
Inverter Type	IGBT-based Sine-Sine PWM Controlled		
Output Power, kW	225	270	360
Output Voltage, VAC	480V 3-ph, 4-w		
Output Voltage Regulation, %	< 1% (3-phase RMS average)		
Output Voltage Regulation (100% Unb. Load)	< 2% (3-phase RMS average)		
Output Frequency, Hz	60		
Output Frequency Regulation, %	± 0.1		
Output THDu Linear Load at Nominal Voltage, %	<2%		
Output THDu at Nominal Voltage Including a 100kVA Non Linear Load per EN 62040-3, %	2.5% (max)		
Capacity to Handle High Crest Factor Load	3:1		
Capacity to handle Step Load, %	0-100 or 100-0		
Transient Recovery (linear loads), %	Within 5% peak-to-peak in one line cycle.		
Unbalance Loads Current Capacity	100% of nominal phase current		
Capacity to Handle Leading PF Load			
0.9 lag to Nom	Subject to Max. kW rating		
at 0.95 Lead	Subject to Max. kW rating		
at 0,9 Lead	Subject to 12.5% kW derate or same Rating and 10°C Temp. Derate		
Voltage Displacement, ° el	120° ±1° el (with 100% unbalanced load)		
Compliance to FCC Class-A	Standard		
Overload Conditions, % FL	105% for 85 minutes 110% for 60 minutes 125% for 10 minutes 150% for 1 minute		

* The UPS will operate at full load, but the battery charge will either be reduced or off (depending on input current).

** The UPS will operate at full load, but UPS may source share with the batteries (depending on input current).

*** UPS will be in Battery mode

Table 6 Liebert NXL UPS specifications *(continued)*

	250	300	400
Physical Parameters and Standards, in (mm)			
Width, With Side Panels	71.8 (1823)	78.5 (1993)	78.5 (1993)
Depth	33.5 (850)	33.5 (850)	39.4 (1000)
Height	76.8 (1950)		
Weight, Unpackaged, lb (kg) approx.	3965 (1798)	4690 (2127)	5250 (2381)
Max heat Dissipation, Full Load, BTU/hr	49,877	58,819	75,676
Cooling Air CFM	4750	4750	7250
Color	Charcoal (ZP-0420)		
Front Door Opening (for serviceability)	More than 180°		
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)		
Minimum Clearance, Top, in (mm)	24 (610)		
Minimum Clearance, Back, in (mm)	0		
Minimum Clearance, Sides, in (mm)	0		
Location of Cable Entrance	Top or Bottom		
Standards and Conformities	UL 1778 CSA 22.2 107.3 FCC Part 15, Class A IEC62040-2, Level 4, Criteria A EN61000-4-3, Level 3, Criteria A EN61000-4-6, Level 4, Criteria A EN61000-2-2, Criteria A EN61000-4-4, Level 4, Criteria A ANSI C62.41, Category A3 &B3 ISTA Procedure 1H WEEE		
Environmental Parameters			
Storage Temperature Range, °F (°C)	-13 to 158 (-25 to 70)		
Operating Temperature Range, °F (°C)	32 to 104 (0 to 40) (UPS)		
Acoustical Noise, dBA	68		
Relative Humidity	95% or less Non-Condensing (Operating and Non-Operating)		
Maximum Altitude Above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% Max kW derate / 328 rise between 4921-9842 (100m rise between 1500-3000m)		

Table 7 Liebert NXL system and inverter efficiencies

UPS Rating		Voltage, VAC			System Efficiency		Inverter Efficiency	
kVA	kW	Input	Bypass	Output	100%	50%	100%	50%
250	225	480	480	480	93.9	93.2	94.8	94.1
300	270	480	480	480	94.0	93.3	94.9	94.2
400	360	480	480	480	94.2	93.4	95.1	94.4

Table 8 Current ratings—rectifier input

UPS Rating		Voltage, VAC			Nominal Current	Maximum Current	External 100% Breaker Trip, Amps	External 80% Breaker Trip, Amps
kVA	kW	Input	Bypass	Output				
250	225	480	480	480	313	392	400	500
300	270	480	480	480	376	469	500	600
400	360	480	480	480	500	625	700	800

Table 9 Current ratings—bypass input

UPS Rating		Voltage, VAC			Nominal Current	10 Minute Overload	External Breaker Trip, Amps
kVA	kW	Input	Bypass	Output			
250	225	480	480	480	301	376	400
300	270	480	480	480	361	451	500
400	360	480	480	480	481	601	700

Table 10 Current ratings—output

UPS Rating		Voltage, VAC			Nominal Current	10 Minute Overload	External Breaker Trip, Amps
kVA	kW	Input	Bypass	Output			
250	225	480	480	480	301	376	400
300	270	480	480	480	361	451	500
400	360	480	480	480	481	601	700

Table 11 Current ratings—battery

UPS Rating		Nominal VDC	Max Battery Current at EOD	External Breaker Trip, Amps
kVA	kW			
250	225	480	615	700
300	270	480	737	800
400	360	480	981	1000

Notes on Tables

1. Nominal input current (considered continuous) is based on full-rated output load. Maximum current includes nominal input current and maximum battery recharge current (considered noncontinuous). Continuous and noncontinuous current are defined in nec 100. Maximum input current is controlled by the current limit setting which is adjustable. Values shown are for maximum setting of 125%. Standard factory setting is 125%.
2. Recommended bypass external overcurrent protection is based on 125% overload capacity for 10 minutes.
3. All recommended external overcurrent protections are based on 80% rated breakers.
4. Nominal battery voltage is shown at 2.0 volts / cell.

Table 12 Recommended conduit and cable sizes

Rectifier Input

UPS Rating		Voltage (VAC)			Nominal Selection		Alternate Selection	
kVA	kW	Input	Bypass	Output	Top Cable Entry Input Wire & Conduit Ph, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, G THW / RNC	Top Cable Entry Input Wire & Conduit Ph, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, G THW / RNC
250	225	480	480	480	(2) 2.5C 3-250kcmil, #1/0AWG	(2) 2.5C 3-250kcmil, #1/0AWG	(3) 2C 3-#2/0AWG, #1/0AWG	(3) 2C 3-#2/0AWG, #1/0AWG
300	270	480	480	480	(2) 3C 3-350kcmil, #1/0AWG	(2) 3C 3-350kcmil, #1/0AWG	(3) 2.5C 3-#4/0AWG, #1/0AWG	(3) 2.5C 3-#4/0AWG, #1/0AWG
400	360	480	480	480	(2) 3C 3-500kcmil, #1/0AWG	(2) 3.5C 3-500kcmil, #1/0AWG	(3) 2.5C 3-250kcmil, #1/0AWG	(3) 2.5C 3-250kcmil, #1/0AWG

Bypass Input

UPS Rating		Voltage (VAC)			Nominal Selection		Alternate Selection	
kVA	kW	Input	Bypass	Output	Top Cable Entry Input Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, N, G THW / RNC	Top Cable Entry Input Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, N, G THW / RNC
250	225	480	480	480	(2) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(2) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(3) 2C 3-#2/0AWG, 2-#2/0AWG, #1/0AWG	(3) 2.5C 3-#2/0AWG, 2-#2/0AWG, #1/0AWG
300	270	480	480	480	(2) 3.5C 3-350kcmil, 2-350kcmil, #1/0AWG	(2) 3.5C 3-350kcmil, 2-350kcmil, #1/0AWG	(3) 3C 3-#4/0AWG, 2-#4/0AWG, #1/0AWG	(3) 3C 3-#4/0AWG, 2-#4/0AWG, #1/0AWG
400	360	480	480	480	(2) 4C 3-500kcmil, 2-500kcmil, #1/0AWG	(2) 4C 3-500kcmil, 2-500kcmil, #1/0AWG	(3) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(3) 3C 3-250kcmil, 2-250kcmil, #1/0AWG

Output

UPS Rating		Voltage (VAC)			Nominal Selection		Alternate Selection	
kVA	kW	Input	Bypass	Output	Top Cable Entry Input Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, N, G THW / RNC	Top Cable Entry Input Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Ph, N, G THW / RNC
250	225	480	480	480	(2) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(2) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(3) 2C 3-#2/0AWG, 2-#2/0AWG, #1/0AWG	(3) 2.5C 3-#2/0AWG, 2-#2/0AWG, #1/0AWG
300	270	480	480	480	(2) 3.5C 3-350kcmil, 2-350kcmil, #1/0AWG	(2) 3.5C 3-350kcmil, 2-350kcmil, #1/0AWG	(3) 3C 3-#4/0AWG, 2-#4/0AWG, #1/0AWG	(3) 3C 3-#4/0AWG, 2-#4/0AWG, #1/0AWG
400	360	480	480	480	(2) 4C 3-500kcmil, 2-500kcmil, #1/0AWG	(2) 4C 3-500kcmil, 2-500kcmil, #1/0AWG	(3) 3C 3-250kcmil, 2-250kcmil, #1/0AWG	(3) 3C 3-250kcmil, 2-250kcmil, #1/0AWG

Battery

UPS Rating		Voltage (VAC)			Nominal Selection		Alternate Selection	
kVA	kW	Input	Bypass	Output	Top Cable Entry Input Wire & Conduit Wires, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Wires, G THW / RNC	Top Cable Entry Input Wire & Conduit Wires, G THW / FMC	Bottom Cable Entry Input Wire & Conduit Wires, G THW / RNC
250	225	480	480	480	(2) 2.5C 2-350kcmil, #1/0AWG	(2) 2.5C 2-350kcmil, #1/0AWG	(3) 2C 2-#4/0AWG, #1/0AWG	(3) 2C 2-#4/0AWG, #1/0AWG
300	270	480	480	480	(2) 2.5C 2-500kcmil, #1/0AWG	(2) 3C 2-500kcmil, #1/0AWG	(3) 2C 2-250kcmil, #1/0AWG	(3) 2C 2-250kcmil, #1/0AWG
400	360	480	480	480	(3) 2.5C 2-500kcmil, #2/0AWG	(3) 2.5C 2-500kcmil, #2/0AWG	(4) 2C 2-250kcmil, #2/0AWG	(4) 2.5C 2-250kcmil, #2/0AWG

Bonding

UPS Rating		Voltage (VAC)			Main Bonding Jumper/ Grounding Electrode Conductor
kVA	kW	Input	Bypass	Output	
250	225	480	480	480	(1) #1/0AWG/ (1) #1/0AWG
300	270	480	480	480	(1) #2/0AWG/ (1) #2/0AWG
400	360	480	480	480	(1) #2/0AWG/ (1) #2/0AWG

If UPS is used in a four-wire system, the neutral ground jumper must be removed.

Table 13 Recommended lug sizes

Cable Size	T&B Series 54000 One Hole	T&B Series 54000 Two Hole
#8 AWG	54930BE	54850BE
#6 AWG	54905BE	256-30695-868
#4 AWG	54906BE	256-30695-733
#2-3 AWG	54942BE	54811BE
#1 AWG	54947BE	54857BE
#1/0 AWG	54950BE	256-30695-593
#2/0 AWG	54951BE	54862BE
#3/0 AWG	54965BE	54864BE
#4/0 AWG	54970BE	54866BE
250kcmil	54913BE	54868BE
300kcmil	54914BE	54870BE
350kcmil	54915BE	54872BE
400kcmil	54916BE	54874BE
500kcmil	54918BE	54876BE
600kcmil	54920BE	54878BE
750kcmil	54922BE	54880BE

Use the T&B crimping tools recommended for these types of lugs.

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